CLAIMS

1. A test system comprising a first computer having input means and output means; a second computer, connected to the first computer via a network including the Internet, having input means and output means; a test management server connected to the first and second computers via the network; and a problem database, accessible by the test management server, for storing a plurality of problems each of which is assigned pre-estimated item parameters including the difficulty level and identifiability of the problem, wherein the test system presents n problems to one testee so as to estimate the ability θ of the testee from his/her responses to the problems, said test management server comprising:

means, responsive to a request transmitted from the first computer, for selecting from the problem database n problems to be marked in such a manner that allows a partial score r_j to be given to the testee's response to a problem j, and transmitting the selected problems to the first computer, wherein $0 \le r_j \le 1$ with 1 being a full mark and $1 \le j \le n$;

answer storage means for storing an answer returned from the first computer, responsive to each of the problems selected from the problem database and transmitted to the first computer;

means, responsive to a request transmitted from the second computer, for reading answers stored in the answer

storage means, and transmitting the read answers to the second computer;

partial score storage means for receiving from the second computer a partial score r_j assigned to the testee's answer transmitted to the second computer, and storing the partial score r_j; and

ability estimation means for estimating the ability θ of the testee who acquires the partial score r_j on the basis of the partial score r_j stored in the partial score storage means and the item parameters of the problem j stored in the problem database; and

wherein, in the ability prediction means, assuming that the partial score r_j is an average value of true-false responses which the testee latently indicates to latent problems to which the testee latently indicates the response of correct answer of 1 or the wrong response of 0 are repeatedly performed s_j times, when $P_j(\theta)$ is the probability that the testee can correctly answer the latent problem and when $Q_j(\theta)$ is $1 - P_j(\theta)$, the ability θ of the testee is estimated using the logarithmic likelihood $l_{part}(\theta)$ represented by the following Equation:

[Equation 40]

$$\ell_{part}(\theta) = \sum_{j=1}^{n} s_j \left(r_j \ln\left(P_j(\theta)\right) + \left(1 - r_j\right) \ln\left(Q_j(\theta)\right) \right)$$

2. The test system according to claim 1, wherein $P_j(\theta)$ is represented as follows using a 2-parameter logistic model:

[Equation 41]

$$P_j(\theta)=\frac{1}{1+\exp\left(-Da_j\left(\theta-b_j\right)\right)}$$

where a_j and b_j in Equation 41 respectively indicate the identifiability and the difficulty level which are the proper feature of the problem stored in the problem database, and D is a constant of 1.7.

3. The test system according to claim 2, characterized in that

when the observed partial score r_j for the problem j is configured by an average of a plurality of manifest true-false problems, the correct answer rate of these true-false problems is represented by Equation 41, and the ability θ of a testee can be estimated using Equation 40.

4. The test system according to any of claims 1 to 3, characterized in that

the ability distribution of a group on which a test is conducted is assumed, the product of the binomial distribution, which is a true-false sum of s_j, and the assumed ability distribution is integrated by the dimension of the ability to obtain the theoretical distribution function of a partial score, and the s_j which is the iterations of latent problems can be estimated such that the obtained theoretical distribution function can best matches the empirical distribution function of the partial score of the actual data.

5. The test system according to any of claims 1 to 4, characterized in that

the output means and the input means of the first and second computers respectively comprise a voice output means and a voice input means, and an answer transmitted to the test server and stored includes voice data.

6. A method for controlling a test system having a first computer having input means and output means, a second computer, connected to the first computer over a network including the Internet, having input means and output means, a test management server connected to the first and second computers over the network, and a problem database accessible by the test management server and storing a plurality of problems for which an item parameter including a difficulty level and identifiability is estimated in advance, with the test system presenting n problems to one testee, and the ability θ of the testee being evaluated from the response of the testee to the presented n problems, characterized in that:

said test management server comprises:

(1) a step of selecting n problems to be marked in an aspect allowing partial score r_j where $0 \le r_j \le 1$ with perfect 1 for the problem j where $1 \le j \le n$ from the problem database in response to a request transmitted from the first computer, and transmitting the selected problems to the first computer;

(2) a step of storing an answer returned from the

first computer in response to the problem selected from the problem database and transmitted to the first computer;

(3) a step of reading an answer stored in said step (2) in response to the request transmitted from the second computer, and transmitting the read answer to the second computer;

(4) a step of receiving a partial score r_j assigned to the answer transmitted to the second computer from the second computer, and storing it; and

(5) a step of estimating the ability θ of a testee who acquires the partial score r_j using the partial score r_j stored in said step (4) and the item parameter of the problem j stored in the problem database, and

in said step (5), $P_j(\theta)$ refers to the probability that the testee can correctly answer the latent problem assuming that the partial score r_j is proper to the problem j and is an average value of true-false response which the testee latently indicates when the latent problems to which the testee latently indicates the response of the correct answer of 1 or the wrong response of 0 are repeatedly performed s_j times, and when $Q_j(\theta)$ is 1 - $P_j(\theta)$, the ability θ of the testee is estimated using the logarithmic likelihood $l_{part}(\theta)$ represented by the following Equation.
[Equation 42]

$$\ell_{part}(\theta) = \sum_{j=1}^{n} s_j \left(r_j \ln\left(P_j(\theta)\right) + \left(1 - r_j\right) \ln\left(Q_j(\theta)\right)\right)$$

7. The method according to claim 6, characterized in

that

$P_j(\theta)$ is represented as follows using a 2-parameter logistic model

[Equation 43]

$$P_j(\theta)=\frac{1}{1+\exp\left(-Da_j\left(\theta-b_j\right)\right)}$$

where a_j and b_j in Equation 43 respectively indicate the identifiability and the difficulty level which are the proper feature of the problem stored in the problem database, and D is a constant of 1.7.

8. The method according to claim 7, characterized in that

when the observed partial score r_j for the problem j is configured by an average of a plurality of manifest true-false problems, the correct answer rate of these true-false problems is represented by Equation 43, and the ability θ of a testee can be estimated using Equation 42.

9. The method according to any of claims 6 to 8, characterized in that

(6) the ability distribution of a group on which a test is conducted is assumed, the product of the binomial distribution, which is a true-false sum of s_j, and the assumed ability distribution is integrated by the dimension of the ability to obtain the theoretical distribution function of a partial score, and the s_j which is the iterations of latent problems can be estimated such that

the obtained theoretical distribution function can best matches the empirical distribution function of the partial score of the actual data.